CLAIMS

1. A method of achieving a therapeutic effect comprising:

providing a particle containing a therapeutic substance to an anatomical structure comprising a lumen such that said particle embolizes within said lumen for a transitory period of less than one week;

wherein said therapeutic substance is released from said particle, causing said therapeutic effect.

2. The method of Claim 1, wherein said anatomical structure has a first region and a second region branching from said first region, said second region being located downstream from said first region, and wherein said providing a particle to an anatomical structure comprises the acts of:

causing an occlusion in said first region at a position downstream of the location at which said second region branches from said first region; and

introducing said particle into said first region upstream of the location at which said second region branches from said first region.

3. The method of Claim 1, wherein said anatomical structure has a first region and a second region branching from said first region, said second region being located downstream from said first region, and wherein said providing a particle to an anatomical structure comprises the acts of:

occluding said first region at positions both upstream and downstream of the location at which said second region branches from said first region; and

introducing said particle into said first region between the upstream and downstream occlusions.

4. The method of Claim 1, wherein said lumen contains an occlusion therein and wherein said providing a particle to an anatomical structure comprises the act of:

introducing said particle into said lumen upstream of said occlusion.

5. The method of Claim 4, wherein said therapeutic substance is an angiogenic substance and wherein said therapeutic effect is collateral growth upstream of said occlusion.

6. The method of Claim 1, wherein said particle reduces in size as said therapeutic substance is released therefrom.

7. A method according to Claim 1 wherein the method of providing a particle further comprises:

preparing a solution;
emulsifying the solution to form an emulsion; and
filtering particles from the emulsion.

8. A method according to Claim 7 wherein:

preparing the solution further includes:
dissolving lecithin and dexamethasone in methylene chloride;
emulsifying the solution further includes:
stirring the solution with a perfluorotributylamine / pluronic F-68 and water solution with heparin; and
filtering particles further includes:
warming the emulsion to drive off the methylene chloride to form microparticles;
collecting the microparticles by filtration;
washing the collected microparticles in cold water;
drying the microparticles in a vacuum; and
separating the microparticles by size using cyclone or tangential flow filtration.

9. A method according to Claim 7 wherein:

preparing the solution further includes:
dissolving Basic Fibroblast Growth Factor, heparin, and lactose in phosphate buffer with Human serum albumin;
emulsifying the solution further includes:
mixing the solution methylene chloride containing polylactide-co-glycolide to form a single emulsion;
stirring the first emulsion with a perfluorotributylamine / pluronic F-68 and water solution to form a double emulsion; and

filtering particles further includes:

warming the emulsion to drive off the methylene chloride to form microparticles;

collecting the microparticles by filtration;

washing the collected microparticles in water;

mixing the washed microparticles with an aqueous solution of mannose in potassium phosphate buffer;

freeze-drying the microparticles in a vacuum; and

separating the microparticles by size using cyclone or tangential flow filtration.

10. A method according to Claim 7 wherein:

preparing the solution further includes:

stirring plasmid DNA and heparin in a solution of dextran and mannose in water;

emulsifying the solution further includes:

emulsifying the solution in cyclo-octane with SPAN 80; and

filtering particles further includes:

filling the emulsion into lyophilization vials to form microparticles;

freeze-drying the microparticles; and

separating the microparticles by size using cyclone or tangential flow filtration.

11. A method of achieving a therapeutic effect comprising:

providing a particle to an anatomical structure having a lumen such that said particle embolizes within said lumen for a transitory period;

wherein said transitory period of embolization causes a brief period of reduced blood flow through said lumen that induces a therapeutic bodily response.

12. The method of Claim 11, wherein said act of providing a particle to said anatomical structure comprises the act of delivering pulses of said particles to said anatomical structure.

13. The method of Claim 12, wherein the act of delivering pulses of said particles causes a series of said brief periods of reduced blood flow;

wherein said therapeutic bodily response induced by said series of brief periods of reduced blood flow is collateral growth.

14. A composition for achieving a therapeutic effect in an anatomical structure comprising a lumen, the composition comprising:

a particle suitable for introduction into an anatomical structure, said particle containing a therapeutic substance and being capable of reducing in size;

wherein said particle is capable of embolizing within said lumen for a transitory period of less than one week; and

wherein said therapeutic substance is released from said particle for the treatment of a patient.

15. The composition of Claim 14, wherein said therapeutic substance is selected from a group of antineoplastic, antiplatelet, anticoagulant, fibrinolytic, antimitotic, thrombin inhibitor, antiinflammatory, antiproliferative, antioxidant, antiangiogenic, angiogenic, arteriogenic, antiallergic substances, and mixtures thereof.

16. The composition of Claim 14, wherein said particle is made of a mixture of at least two different substances.

17. The composition of Claim 16, wherein each of said substances reduces in size in said lumen at a different rate.

18. The composition of Claim 14, wherein said particle is made of a first substance and a second substance, said second substance covering at least a portion of said first substance, wherein each of said substances reduce in size in said lumen at a different rate.

19. The composition of Claim 14, wherein said particle reduces in size as said therapeutic substance is released therefrom.

20. A composition for achieving a therapeutic effect in an anatomical structure comprising a lumen, said composition comprising:

a particle suitable for introduction into an anatomical structure, said particle being capable of reducing in size;

wherein said particle is capable of embolizing within said lumen for a transitory period, causing a brief period of reduced blood flow which induces a therapeutic bodily response.

21. A method of achieving a therapeutic effect within an anatomical structure having a first region and a second region, said second region being located downstream of said first region and having a smaller cross-sectional diameter than said first region, the method comprising the acts of:

(a) providing a particle having a first size in which said particle is not capable of passing from said first region into said second region, said particle being capable of reducing in size; and

(b) delivering said particle having said first size to said first region of said anatomical structure;

wherein said particle subsequently reduces from said first size to a smaller second size as said particle travels through said anatomical structure, allowing said particle to pass into said second region; and

wherein a therapeutic effect is achieved.

22. The method of Claim 21, wherein said particle includes a therapeutic substance;

wherein said therapeutic substance is released from said particle; and

wherein said therapeutic effect results from said therapeutic substance.

23. The method of Claim 21, wherein during said act of traveling through said anatomical structure and prior to said act of reducing to said second size, said particle reaches a diameter of said anatomical structure through which said particle cannot pass and at which said particle is constrained for a transitory period until said particle reduces to said second size.

24. The method of Claim 23, wherein said particle includes a therapeutic substance and wherein said transitory period is less than one week;

wherein said therapeutic substance is released from said particle; and

wherein said therapeutic effect results from said therapeutic substance.

26. The method of Claim 24, wherein said particle reduces in size as said therapeutic substance is released therefrom.

27. The method of Claim 21, wherein during said act of traveling through said anatomical structure, said particle becomes transiently lodged in a plurality of locations throughout said anatomical structure as said particle reduces in size over a period of days, providing said therapeutic effect over a length of said anatomical structure.

28. The method of Claim 21, wherein said anatomical structure is within a mammalian cardiovascular system,

wherein a brief period of reduced blood flow is caused during said transitory period; and

wherein said therapeutic effect is a therapeutic bodily response induced by said brief period of reduced blood flow.

29. The method of Claim 21, wherein said anatomical structure comprises a single lumen containing said first region and said second region.

30. The method of Claim 21, wherein said anatomical structure comprises a lumen network including a plurality of lumens.

31. The method of Claim 21, wherein said anatomical structure additionally includes a third region, said third region being located downstream of said second region and having a smaller cross-sectional diameter than said second region;

wherein said particle is capable of reducing from said second size to a smaller third size, allowing said particle to pass from said second region into said third region.